Materials Sciences Division
Integrated Safety Management (ISM) Plan

The Materials Sciences Division (MSD) will conduct all of its activities in a manner that protects the health and safety of its employees, guests, and the general public and that does not endanger the environment. All activities will be carried out in a manner consistent with all applicable Berkeley Lab (LBNL), University of California, and Federal and State government agency policies and regulations as described in the Regulations and Procedures Manual (RPM), PUB-3000, the Operating and Assurance Plan (OAP), and other applicable documents. This document describes the procedures that will be applied in MSD to insure that these policies are properly implemented.

1.1 Scope of Plan

MSD had an annual budget of $72M in FY04 ($35M of this funding is for the Molecular Foundry Construction project).. The following table classifies the personnel assigned to MSD as of 7/14/04.

Category	Total
Faculty Principal Investigators (PIs) and LBNL Staff PIs	79
LBNL Staff Scientists/Engineers and Faculty who are not PIs	28
Post-docs whose primary work is for LBNL (includes those directly paid by LBNL and those who supported by other organizations and thus are LBNL guests)	94
Graduate students whose primary work is for LBNL (includes those directly paid by LBNL and those who supported by other organizations and thus are LBNL guests)	150
Student assistants and undergraduates	45
Technicians	19
Faculty, Scientists, Post-dos, and graduate students who do their primary work at another institution and who are LBNL guests (e.g. NCEM users)	102
Total	**517**

In addition to the personnel categorized above, MSD has 21 ASD matrixed career employees, 4 HR matrixed career employees, and 10 administrative guests. With the exception of two large centers, most of the research is performed either by small groups of students, postdoctoral fellows, and scientists under the direction of a Principal Investigator (PI) (most of whom hold joint appointments as University of California at Berkeley (UCB) faculty) or by clusters of individual PIs and their groups working together in "topic-focused" programs. The research groups operate in 6 different buildings at LBNL and 8 buildings on the UC campus

During FY04 construction began on the Molecular Foundry, a six-level laboratory and office building to be located between Buildings 66 and 72. This construction will continue for several years, and will result in periodic temporary disruptions of services to MSD buildings. It will also carry with it typical hazards associated with construction. The construction contractor will administer his/her own Health and Safety Plan for the project, which will be supervised by the Facilities Division. Disruptions to ongoing MSD activities will be identified and mitigated by meeting and planning with the construction personnel as appropriate.

This ISM Plan covers all MSD workers, including employees, students, guests, and visiting scholars, regardless of source of compensation and regardless of work location (this includes remotes sites, as well). A large fraction of MSD's employees and guests

perform their research in laboratories on the UCB campus and do little or no scientific work in LBNL laboratories. LBNL and UCB recently ratified the "Partnership Agreement Between UCB and LBNL Concerning Environment, Health and Safety Policy and Procedures" (http://www.lbl.gov/ehs/ism/ucb_lbl_partnership_3_15_04.pdf) dated March 15, 2004. Aspects of the Partnership Agreement relevant to MSD Investigators are as follows.

- LBNL PIs have an obligation to Berkeley Lab management to provide a safe workplace for all Berkeley Lab-sponsored work, regardless of the place where this work is performed. At UCB, this is satisfied by complying with the UCB Safety System.
- PIs are responsible for analyzing work of persons under their direction and for assuring that the proper training for safe conduct of work is identified and obtained. Until an individual has been properly trained, s/he will work under the direct supervision of someone who is already trained. The type and method of training for work performed at UCB is specified by UC Berkeley.
- PIs conducting Berkeley Lab-sponsored work are free to implement controls and other measures beyond the institutional requirements if they deem it appropriate.
- PIs working at UCB can request a joint safety assessment (to be conducted by representatives of both the UCB and LBNL EH&S organizations) to further aid them in ensuring a safe workplace.
- PIs conducting Berkeley Lab-sponsored work at UCB will provide an assurance that they have met UCB standards including properly specifying training requirements (for themselves, workers and students), obtaining and adhering to UCB work authorizations, and meeting UCB self-inspection requirements.

Within MSD, procedures differ for assuring compliance with this ISM plan depending upon whether the work is performed at the LBNL main Hill site or on the UC Berkeley campus, as outlined below.

Plan element	LBNL verification mechanism	UCB campus verification mechanism
All staff (employees and guests, including students of either status) are properly trained to perform the work, or directly supervised by someone who is properly trained.	Job Hazards Questionnaire (JHQ), EHS Training database, and PI signature on Safety Assurance Statement (SAS), see Section 1.2 below.	**Present:** PI signature on Safety Assurance Statement (SAS), see Section 1.2 below. Assurance for UCB training is implicit in the JHQ submission process (Hill PIs must certify that their employees/guests will be properly trained). **Future:** A JHQ that identifies UCB classes is planned to be available in Summer 2004. Once that becomes available, the SAS will not suffice for assurance of compliance with campus training requirements, the JHQ and LBNL Training Database will be used.
Hazards from all work have been properly identified and mitigated.	MSD Self Assessment inspection; Triennial Integrated Functional Appraisal (IFA); Laboratory Corrective Action Tracking System (LCATS); Activity Hazard Documents (AHDs); Biological Use Authorizations (BUAs); Sealed Source Authorizations (SSAs).	UCB Laser Use Authorizations, Biohazard Use Authorizations. UCB has its own verification system that will be used to assure that hazards have been identified and corrected. If UCB conducts a verification inspection the PI will forward the results of that verification inspection to MSD. Finally, the PI signature on the Safety Assurance Statement (SAS), see Section 1.2 below, verifies that hazards have been identified and mitigated.
Work spaces have been inspected at least annually to identify and correct hazards.	MSD Self Assessment inspection, PI signature on Safety Assurance Statement (SAS) stating that PI has inspected his/her laboratories.	Annual inspection are required by UCB policy. UCB requires that a Self Inspection Checklist be prepared for laboratory spaces. LBNL researchers in UCB space should submit a copy of this checklist to the Division as verification that the inspection has been performed.

1.2 Accountability

Principal Investigators (PIs) are responsible and accountable to the MSD Division Director for assuring that all activities under their direction are carried out in a safe manner and in accordance with all LBNL EH&S policies and requirements. This responsibility and accountability cannot be delegated. PIs confirm this responsibility at least annually through their signature the MSD Safety Assurance Statement (SAS) which is required for all proposals processed through MSD. The document has been revised to

reflect roles and responsibilities defined in the new Partnership Agreement. The proposed revised text of this document is given below.

> **For All MSD PIs:**
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> I have reviewed the impact of the component of the research described in this proposal that will be performed in my laboratories under my direction on the environment and on the health and safety of the staff, students and visitors who will do the work. I certify the following:
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> 1. Proper procedures, equipment, and facilities will be employed and all staff will be properly trained to carry out this work in a safe and environmentally benign manner. In determining that all the procedures, permits, authorizations, and/or approvals required for my new and ongoing projects are in place I consulted with LBNL Pub 3000, the MSD Project Hazard Guide, or UCB safety guidelines as appropriate.
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> 2. **Research in LBNL Main site laboratories**. For all my research projects, regardless of funding source, that are pursued in LBNL space, I have personally inspected all of the laboratory space under my direction and have given a safety presentation to all of the staff, students, and visitors under my supervision at least once in the past year and will do so at least once in the coming year.
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> 3. **Research in UCB laboratories** For all my research projects that are funded through LBNL and pursued in UCB space, I or my designee has personally inspected all of the laboratory space under my direction at least once in the past year using the appropriate checklist for my UCB department and has ensured that the completed checklist has been submitted to the appropriate UCB Department Safety Coordinator with a copy sent to the MSD EHS Administrator.This will be completed at least once in the coming year.

PIs consult with qualified specialists (e.g. the MSD EH&S Coordinator or the UCB or LBNL EH&S Division Staff) to achieve the required expertise about complying with EH&S requirements.

MSD PIs are responsible for the safety of contracted work per the following table.

Expectation	Responsibility
Qualified contractors/service vendors are selected	In practice, any purchase requisition or order placed by LBNL Procurement requires that contractors have a safety plan that meets LBNL requirements.
Hazards are identified	MSD is responsible for providing safe working conditions so that our contractors are not put at risk. In MSD, this falls under the expectation that PIs insure that "hazards from all work have been properly identified and mitigated."
Work is performed safely within division space	MSD can provide a safe working environment and can ensure that vendors have an acceptable safety plan, but MSD PIs do not directly supervise nor direct the work of employees of vendors providing contracted services in MSD spaces.

1.3 Development and Enforcement of MSD EH&S Policies

MSD maintains a Division Safety Committee that has the following membership.

- MSD Group Safety Representatives. Each LBNL Hill-based research group has a designated Group Safety Representative. Group Safety Representatives serve as point-of-contact between the Division Safety Committee and researchers in the division's research groups and are responsible for timely dissemination of policy

information provided by EH&S Division and the MSD Division Safety Committee to members of their respective research groups and for the safety awareness of their research group. Typically this person is a senior graduate student or post-doctoral fellow, although a number of Staff Scientists and PIs serve as Group Safety Representatives.

- Building Managers of buildings 62, 66, 72, and 2.
- The MSD Safety Coordinator (Committee Chair).
- The MSD EH&S Administrator
- The EH&S Division Liaison to MSD

The committee typically meets once every two to three months and is responsible for the oversight of MSD safety issues and for suggesting to MSD Management new EH&S policies. Minutes of the meetings are e-mailed to all MSD PIs.

The MSD Safety Coordinator is responsible for maintaining this Integrated Safety Management Plan, insuring that the annual Self Assessment inspections are performed, writing the annual Self Assessment Report, and promoting general EH&S awareness.

MSD PIs having operations at UCB operate through the host UCB department's safety management system.

2.1 Scope of Work Authorized

> *MSD conducts basic research in areas of materials sciences consistent with the mission of the Department of Energy. MSD is dedicated to discovering, creating and developing the new materials and phenomena that advance society's understanding of nature, benefit other scientists in their research efforts, and provide the basis for technology development in other institutions, including U.S. industry.*

MSD investigators are trained in materials science, physics, chemistry, and biology and perform laboratory-scale experiments and theoretical modeling of electronic materials, metals, alloys, ceramics, polymers, catalysts, electronic materials, nanoscale systems, and biomolecular materials. Current MSD research programs at LBNL and on the UCB Campus employ table-top lasers, synchrotron end-stations, state-of-the-art electron microscopes, materials synthesis and processing laboratories, machine shops, electronics shops, vacuum systems, wet chemistry and biological labs, and other required equipment and facilities.

Research activities proposed in Field Task Proposals/Agreements (FTP/As), Work for Others (WFO) requests, Cooperative Research and Development Agreements (CRADAs), Laboratory Directed Research and Development (LDRD) proposals, and other research documents are reviewed for compliance with Laboratory EH&S policies. PIs are responsible both for identifying proposed research activities that have the potential for being hazardous and also for working with appropriate LBNL staff to assure that the research can be pursued safely prior to commencement of experiments or contractual commitment. In addition, each PI prepares EH&S documentation and obtains all required approvals for potentially hazardous or regulated work as defined in Chapter 6 of PUB-3000 prior to commencement of that work. Work of this kind that is currently carried out at LBNL is regulated by Activity Hazard Documents (AHDs); MSD has more than 30 AHDs in place as of June, 2004. MSD also has a number of Biological Use Authorizations (BUAs) and Sealed Source Authorizations (SSAs).

2.2 Qualification and Training

It is the responsibility of the PIs to determine and document that each employee or guest under his/her supervision has the requisite qualifications and training to perform his/her work safely. (Administrative supervisors have a similar responsibility for administrative staff.) The MSD policy on training is somewhat more strict than the general LBNL policy and is summarized below.

> All MSD employees and guests must be fully trained before they can perform laboratory work. The sole exception is participating guests who are here for less than one week; they may do laboratory work without LBNL training but only under the direct supervision of an LBNL Staff Member who is appropriately trained. It is the responsibility of the supervisor to insure that all personnel are properly trained. Hill training requirements are determined by the MSD-specific Job Hazards Questionnaire, which is hosted on the EH&S Division website (a campus version is planned to be available in summer 2004). There are three ways to satisfy a Hill training requirement.
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> - By viewing a video or web-based slideshow of the training class. There are several ways to do this. The MSD Internal web site has streaming video versions of some commonly required training courses along with self-tests that ensure that the employee/guest has understood the material. The MSD EHS Administrator (see below) can provide a CD with the streaming video versions and the appropriate viewer software upon request. In any of these cases, the MSD Internal web site has self-test material to help supervisors insure that the employee/guest has learned the training material. Some classes (e.g. EHS 405, General Employee Radiation Training) are hosted on the EHS Training website.
> - EHS Division offers standard classroom training for most of these classes 1-2 times per month. The schedule for these classes is in Currents and on the EHS Division web site.
> - By supervisor exemption. A supervisor may exempt an employee/guest from a required training class if the supervisor certifies, either directly or by proxy, on EHS JHQ website that the employee/guest has already been trained for a particular hazard by a combination of prior experience (includes training classes taken at other institutions) and/or on-the-job training.
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> All training must be completed before an employee/guest is allowed to work in a laboratory. Card key access will not be granted and laboratory room keys will not be issued until this form is completed. Untrained individuals may not work MSD laboratories. The DOE research account of the supervisor may be subject to fines for violation of this policy.

Employees are expected to work safely and to cooperate with MSD EH&S efforts. If they have any questions about the safety or environmental impact of a laboratory activity, they must stop the work and resolve the issue before proceeding. Also, under LBNL's "Stop Work" policy, whenever an employee, contractor, or participating guest encounters conditions or practices that appear to constitute an imminent danger (i.e. cause death, serious injury, or environmental harm), they have the authority and responsibility to:

- Alert the affected employee(s) and request that the work be stopped.
- Call the Berkeley Lab emergency telephone number (x7911) and report the situation. The EH&S duty officer will be notified to follow up.
- Inform the immediate supervisor, EHS coordinator, or manager (if known).

2.3 Integration of EH&S into Project Planning

PIs will incorporate appropriate resource allocations for EH&S-related activities into all research proposals, including costs of safety equipment, permits, training,

maintenance, waste disposal, and facilities modifications, unless these costs are covered by LBNL institutional funding sources.

2.3 MSD Use of EH&S Resources

The following divisional resources are allocated to ensure implementation and execution of the MSD Division Safety Plan: MSD Safety Coordinator and representative to Laboratory Safety Review Committee (0.15 FTE), MSD EHS Administrator (0.15 FTE), and 0.15 FTE of the Building Manager of B62/66 for self-assessment inspections. Baseline support from EH&S Division comes from the areas of Laser and Radiation Safety, Waste Generator Assistance, Industrial Hygiene, Fire Protection, Occupational Safety, and Emergency Services, and Environmental Protection and consists of chemical waste pickup and disposal, training classes, assistance with the annual Self Assessments and other inspections, and advice on the design of new laboratory spaces. It is estimated that 1.00 FTE total of EH&S effort is required for these activities.

3 Mechanisms to Judge Efficacy of ISM Plan

The results of the annual self-assessment inspection are an important measure of the efficacy of MSD EH&S policies. In addition to the Performance Criteria provided by EH&S, MSD judges its EH&S performance with the following criteria: execution of Self-Assessment inspections on time, all LCATS findings closed, all SAAs in compliance, all hazardous waste properly described, all employees and guests properly trained, all AHDs reviewed and approved annually, an OSHA accident rate of as close as possible to zero, and all chemicals properly inventoried in accordance with Laboratory expectations.

4 Signatures

Submitted by

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EH&S Resource Commitment

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Accepted

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